

University of Groningen

## Aspects of self differ among physically active and inactive youths

Veselska, Zuzana; Geckova, Andrea Madarasova; Reijneveld, Sijmen A.; van Dijk, Jitse P.

*Published in:*  
International Journal of Public Health

*DOI:*  
[10.1007/s00038-010-0203-y](https://doi.org/10.1007/s00038-010-0203-y)

**IMPORTANT NOTE:** You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

*Document Version*  
Publisher's PDF, also known as Version of record

*Publication date:*  
2011

[Link to publication in University of Groningen/UMCG research database](#)

### *Citation for published version (APA):*

Veselska, Z., Geckova, A. M., Reijneveld, S. A., & van Dijk, J. P. (2011). Aspects of self differ among physically active and inactive youths. *International Journal of Public Health*, 56(3), 311-318.  
<https://doi.org/10.1007/s00038-010-0203-y>

### **Copyright**

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

The publication may also be distributed here under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license. More information can be found on the University of Groningen website: <https://www.rug.nl/library/open-access/self-archiving-pure/taverne-amendment>.

### **Take-down policy**

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

*Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.*

# Aspects of self differ among physically active and inactive youths

Zuzana Veselska · Andrea Madarasova Geckova ·  
Sijmen A. Reijneveld · Jitse P. van Dijk

Received: 16 April 2010 / Revised: 11 October 2010 / Accepted: 12 October 2010 / Published online: 30 October 2010  
© Swiss School of Public Health 2010

## Abstract

**Objectives** The aim of this paper was to explore connection between aspects of self and levels of physical activity among adolescents.

**Methods** An international sample of 501 elementary school students (mean age  $14.7 \pm 0.9$  years, 48.5% males) from the Slovak and Czech Republics completed the Self-competence/Self-liking Scale, the Rosenberg's Self-esteem Scale, the Self-efficacy Scale and a question on their physical activity. Respondents were divided into three groups: (1) no physical activity; (2) infrequent physical activity; (3) everyday physical activity. Data were explored with one-way analysis of variance (ANOVA) separately for each gender.

**Results** Boys with no physical activity had lower self-liking and social self-efficacy in comparison with boys with everyday physical activity. Girls with no physical activity had lower positive self-esteem, self-liking, self-competence, general and social self-efficacy and higher negative self-esteem in comparison with girls with infrequent and everyday physical activity.

**Conclusion** Regular physical activity is connected with psychological aspects of self among adolescents, especially

girls. Incorporating physical activity into the life of youths on a regular basis might lead to the enhancement of their feelings of self-worth and self-efficacy.

**Keywords** Self-esteem · Self-efficacy · Physical activity · Adolescence · Gender

## Introduction

Previous studies have shown that regular physical activity among adolescents can contribute to both their physical health and their psychological and social well-being (Iannotti et al. 2009; Schmalz et al. 2007; Tessier et al. 2007; Parfitt and Eston, 2005). In addition, physical activity during early adolescence has been shown to persist from adolescence into adulthood (Hallal et al. 2006). However, recent international studies (Haug et al. 2009; Currie et al. 2000, 2004, 2008) show a lack of sufficient physical activity during adolescence, particularly among girls. These findings indicate that the lack of regular physical activity among adolescents is a long-term public health problem (Hallal et al. 2006). In the present study we focus on the connection between the frequency of physical activity and aspects of self (self-efficacy, self-esteem, self-liking and self-competence) in early adolescence and on potential gender-related differences.

Self-esteem, self-liking, self-competence and self-efficacy could be conceptualized as aspects of the construct 'self'. The current conceptualization allows the distinguishing between cognitive aspects and evaluative aspects (Campbell et al. 1996). Self-esteem as the evaluative aspect of self (Harter 1999) representing person's overall feeling of self-worth (Rosenberg 1965). Self-esteem has well-known consequences for current physical and mental

Z. Veselska · A. Madarasova Geckova · J. P. van Dijk  
Kosice Institute for Society and Health, PJ Safarik University,  
Kosice, Slovak Republic

Z. Veselska (✉) · A. Madarasova Geckova  
Department of Health Psychology, Medical Faculty,  
Institute of Public Health, PJ Safarik University,  
Tr. SNP 1, 04066 Kosice, Slovak Republic  
e-mail: zuzana.veselska@upjs.sk

S. A. Reijneveld · J. P. van Dijk  
Department of Social Medicine, University of Groningen,  
Groningen, The Netherlands

health and health-related behaviors. Positive self-esteem is not only seen as a basic feature of mental health but also as a protective factor that contributes to better physical health and health-related behaviors through its role as a buffer against the impact of negative influences (Mann et al. 2004). It has been repeatedly associated with health-related behaviors, e.g. physical activity in past research (White et al. 2009; Krahnstoever Davisona et al. 2007; Schmalz et al. 2007; Levy and Ebbeck 2005; Parfitt and Eston 2005). Mentioned studies confirmed a connection between physical activity and higher self-esteem.

Self-liking (sense of social worth) and self-competence (sense of personal efficacy) used in this study were defined by Tafarodi and Swann (1995) as constructs emerging from global self-esteem and were proposed as interdependent but separate aspects of self-esteem. Self-competence is defined as the evaluative experience of oneself as an intentional being with efficacy and power. Self-liking, on the other hand, is defined as the evaluative experience of oneself as a good or bad person according to internalized criteria for worth. These two dimensions could be extracted also from the Rosenberg Self-esteem Scale as it was confirmed in other studies (Tafarodi and Milne 2002; Schmitt and Allik 2005). Therefore, it could be expected that self-liking and self-competence will be associated with the physical activity similarly like self-esteem.

Self-efficacy, conceptualized primarily as a belief in one's capabilities to organize and execute the courses of action required to manage prospective situations, is a construct created in Bandura's (1986) Social Cognitive Theory and is similar to the perceived behavioral control in Ajzen's (1988) Theory of Planned Behavior (TPB). It was repeatedly associated with physical activity (White et al. 2009; Annesi 2006). People's perceptions of their own efficacy influence the choices they make, their aspirations, the amount of effort that they mobilize for given behaviors and their perseverance if they meet difficulties (Bandura 1986). Self-efficacy is therefore generally considered to be an important determinant of health-related behaviors. Typically, research finds strong association between perception of self-efficacy and engagement in physical activity. Though, it should be mentioned that those studies mostly focused on behavior specific self-efficacy. Our study focus on the self-efficacy as general construct and also cover specific efficacy in the area of social interactions.

Most studies have examined physical activity as a continuous or dichotomous variable, whereas our study included three categories based on frequency to account for a not fully continuous measurement level. The single-item moderate to vigorous physical activity measures, such as the one used in present study, were developed to provide a

screening measure for use with children and adolescents. Based on the validation studies by Booth et al. (2001) and Prochaska et al. (2001), the single-item moderate to vigorous physical activity measure appears to have acceptable reliability and validity levels. Also, most of the studies explore only one of the self-perception aspects. For this reason we explored the relation between the frequency of physical activity and the aspects of self perception (e.g. higher self-esteem, self-competence or self-efficacy). Last to be mentioned, studies exploring self-perception and physical activity usually do not look into gender differences.

Regarding gender differences, adolescent girls were found to be less engaged in physical activities than boys (Currie et al. 2000, 2004, 2008). Still, whether their engagement in physical activity can be explained and possibly be enhanced by their different perceptions of self in comparison with boys is a question that needs to be explored.

The aim of this paper was to explore whether aspects of self (self-esteem, self-liking, self-competence, and self-efficacy) are associated with different levels of physical activity among adolescent boys and girls. We will explore whether at least some physical activity, even though infrequent, is similarly associated with aspects of the self as frequent, i.e. everyday physical activity. We will also explore gender-related differences regarding this as well.

## Methods

### Sample and procedure

The study sample consisted of 501 pupils from the last two grades of elementary schools in the eastern part of Slovakia (cities of Kosice and Presov) and the eastern part of Czech Republic (Brno). These three cities are comparable in that they are the second and third biggest towns in economically less-developed districts of the eastern parts of their respective countries. The schools and classes were selected randomly in each city. Directors of the selected schools were asked for participation via telephone. After their approval and the approval of parents, data were collected. Of the study sample ( $n = 501$ ), 48.5% were boys; ages of both genders ranged from 11.5 to 16.3 years (mean 14.7 years, SD 0.90). Trained researchers and research assistants collected data in June and September 2007. The set of questionnaires was administrated during two regular 45-min lessons in a complete 90-min period of time on a voluntary and anonymous basis in the absence of teachers. Response was 91.5%, with non-response due mostly to school absence because of illness or other reasons. The data

collection was a part of the survey ‘Individual, interpersonal, social and societal factors of health-related behavior in adolescence’. All questionnaires used in this study underwent the process of back-translation from English to Slovak language to ensure that language versions used in this study measure same constructs as the original language versions.

## Measures

Self-esteem was assessed using the Rosenberg Self-esteem Scale RSES (Rosenberg 1965). The RSES can be divided into an equal number of positively (6 items) and negatively (6 items) worded items measuring positive and negative self-esteem (Halama 2008; Sarkova et al. 2006). Responses range on a 4-point scale from 1 (strongly disagree) to 4 (strongly agree). Higher scores indicate higher positive and negative self-esteem, respectively. Cronbach’s alpha was 0.78 for the positive self-esteem subscale and 0.66 for the negative self-esteem subscale.

Self-liking/Self-competence Scale by Tafarodi and Swann (1995) was used for measuring self-liking (10 items) and self-competence (10 items). Responses range on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). Higher scores indicate higher self-liking and self-competence. Cronbach’s alpha was 0.81 for self-liking and 0.82 for self-competence.

Self-efficacy Scale by Sherer et al. (1982) was used for measuring general (17 items) and social (6 items) self-efficacy. Responses range on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree), with higher scores indicating higher self-efficacy. Cronbach’s alpha was 0.82 for general self-efficacy and 0.61 for social self-efficacy.

Physical activity was assessed using a single question transformed from a single question repeatedly used and validated in HBSC surveys (Currie et al. 2000, 2004, 2008): “How often per week do you have physical activity for more than 20 min?”, with answers of (1) never; (2) once a week; (3) 2–3 times a week; (4) every day. For the purpose of the present study, respondents were divided into three groups based on their answers: (1) no physical activity (never); (2) infrequent physical activity (1–3 times a week); and (3) everyday physical activity (every day). Similar categorization of single self-reported item on the frequency of physical activity was used in the study of Mäkinen et al. (2009).

Socioeconomic status was assessed by parents’ education level, defined as the highest level of education obtained by each parent of the respondents. Education level from both parents was combined into one indicator and was classified as high (university), middle (secondary school) or low (apprenticeship or primary school only).

## Statistical analysis

Before the analyses were made, the subsamples from Slovakia and Czech Republic were compared regarding the frequency of physical activity and also of self variables. Very similar results were obtained for both subsamples, with the *P*-values for differences in outcomes all being 0.05 or higher and effect sizes for differences all being trivial. Therefore, we decided to merge these two subsamples and work with this main research sample. Standard descriptive analyses were performed in the first step to describe the background characteristics of the three categories of adolescents based on frequency of their physical activity per week, and we also tested correlations between self variables using Pearson’s correlation coefficient and for possible gender differences in those variables using independent samples *t* test. Second, one-way analysis of variance (ANOVA) and Scheffé Post Hoc tests were used to explore the differences in aspects of self between the three groups (no physical activity, infrequent physical activity and everyday physical activity). These analyses were repeated separately for boys and girls. Finally, we performed Multiple Classification Analysis (MCA) (Andrews et al. 1973) procedure within ANOVA statistics to explore in more detail associations between physical activity groups and aspects of self variables. All analyses were performed using SPSS version 16.0.

## Results

The background descriptive characteristics of the whole study sample and of the three groups regarding the frequency of physical activity per week are presented in Table 1. Levels of physical activity differed by gender with statistical significance (chi-square test). We therefore stratified the further analyses by gender, as shown in Table 4.

Correlation matrix of all self variables is presented in Table 2. As a part of the descriptive statistical analysis we also tested possible gender differences in the self variables, and no significant differences were found in our study with the exception of self-liking, in which girls report lower levels of self-liking, and social self-efficacy, in which girls report higher levels of social self-efficacy. In the other non-significant results girls reported lower levels of the self variables.

Analysis of variance and Scheffé Post Hoc tests (Table 3) revealed significant differences between adolescents with no physical activity and adolescents with infrequent or everyday physical activity regarding aspects of self. Positive self-esteem, self-liking, self-competence, as well as general and social self-efficacy were higher, and

**Table 1** Descriptive statistics of the sample by frequency of physical activity (Slovakia and Czech Republic, 2007)

	Group 1 No activity	Group 2 Infrequent activity	Group 3 Everyday activity	Total study sample	<i>P</i> value
<i>N</i>	87	295	98	480	
%	18.1	61.5	20.4		
Age					<0.05*
Mean (SD)	14.68 (0.91)	14.16 (1.06)	14.74 (0.88)	14.70 (0.90)	
Range	12.1–16.2	11.5–16.3	12.2–16.3	11.5–16.3	
Gender					<0.001**
Boys (%)	39.1	47.1	62.2	48.5	
Girls (%)	60.9	52.9	37.8	51.5	
Parents' educational level					N.s.
Low (%)	1.1	0.7	1.0	0.9	
Middle (%)	67.8	61.2	55.6	61.6	
High (%)	31.1	37.6	43.4	37.5	

N.s. not statistically significant

\* *F* test

\*\* Chi-square test

**Table 2** Correlation matrix of all self variables (Slovakia and Czech Republic, 2007)

		1	2	3	4	5	6
1	Self-esteem positive	1					
2	Self-esteem negative	−0.45***	1				
3	Self-liking	0.64***	−0.57***	1			
4	Self-competence	0.60***	−0.50***	0.73***	1		
5	Self-efficacy general	0.48***	−0.43***	0.45***	0.58***	1	
6	Self-efficacy social	0.21***	−0.21***	0.24***	0.31***	0.35***	1

\*\*\*  $p < 0.001$  Pearson's correlation coefficient**Table 3** Differences between outcome groups in aspects of self with one-way analysis of variance (*F* values from ANOVA) resulting *P* values, and Scheffé Post Hoc test-differences, for both genders combined (Slovakia and Czech Republic, 2007)

	Group 1 ( <i>n</i> = 87)		Group 2 ( <i>n</i> = 295)		Group 3 ( <i>n</i> = 98)		<i>F</i> value	<i>df</i>	<i>P</i> value	Scheffé test-differences
	Mean	SD	Mean	SD	Mean	SD				
Self-esteem										
Positive	13.3	2.88	14.6	2.21	15.0	2.56	12.17	2	<0.001	1–2***, 1–3***
Negative	13.4	2.61	12.3	2.65	12.1	2.60	7.00	2	<0.001	1–2***, 1–3***
Self-liking	30.1	7.61	33.2	5.92	34.8	6.98	11.36	2	<0.001	1–2***, 1–3***
Self-competence	31.8	6.72	34.8	5.76	35.7	6.38	10.56	2	<0.001	1–2***, 1–3***
Self-efficacy										
General	53.6	8.27	58.2	8.82	59.3	9.29	11.10	2	<0.001	1–2***, 1–3***
Social	18.9	4.16	20.3	3.57	20.9	3.60	6.87	2	<0.01	1–2***, 1–3***

Group 1: no physical activity

Group 2: infrequent physical activity

Group 3: everyday physical activity

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

negative self-esteem was lower among adolescents with a higher frequency of physical activity.

Table 4 presents results from analyses of variance and Scheffé Post Hoc tests separately for boys and girls. Boys with everyday physical activity had higher self-liking and social self-efficacy than boys with no physical activity. The other four  $F$  tests for boys yielded no statistically significant differences. Girls with infrequent and everyday physical activity had higher positive self-esteem, self-liking, self-competence, general and social self-efficacy and lower negative self-esteem than girls with no physical activity. Interestingly, boys with infrequent and everyday physical activity had more positive scores on most self variables. However, these only reached statistical significance for self-liking and social self-efficacy. Out of the 54 comparisons that we made, two can be expected to be statistically significant at  $P < 0.05$  just due to chance. The number of statistically significant associations largely exceeds this number.

Finally, we explored the influence of self-liking, self-competence, general and social self-efficacy on the (statistically significant) associations of positive and negative self-esteem with levels of physical activity. We did this by using Multiple Classification Analysis procedures in ANOVA, and only for girls, because only among them did we find statistically significant associations between the self variables and physical activity. In these analyses, physical activity was entered as an independent factor, with self-liking, self-competence, general and social self-efficacy as covariates. After adding the self variables to the model, physical activity was no longer significantly associated statistically with positive ( $F = 0.18$ ,  $P = 0.84$ ) and negative self-esteem ( $F = 1.30$ ,  $P = 0.28$ ). In those analyses, from among the other self variables, only self-liking ( $F = 65.49$ ,  $P < 0.001$ ), self-competence ( $F = 7.82$ ,  $P < 0.001$ ) and general self-efficacy ( $F = 7.93$ ,  $P < 0.001$ ) were statistically associated with positive self-esteem. Self-liking ( $F = 44.79$ ,  $P < 0.001$ ) and general self-efficacy ( $F = 9.56$ ,  $P < 0.001$ ) were significantly associated statistically with negative self-esteem. These results might be interpreted such that the association of positive self-esteem with physical activity runs at least partially via self-liking, self-competence and general self-efficacy, and the association of negative self-esteem via self-liking and general self-efficacy.

## Discussion

Our study shows that positive self-esteem, self-liking, self-competence, general self-efficacy, and social self-efficacy were higher and negative self-esteem was lower among adolescents with a higher frequency of physical activity.

**Table 4** Difference found between outcome groups in aspects of self using one-way analysis of variance (ANOVA), resulting  $P$  values and Scheffé Post Hoc test-differences for boys and girls shown separately (Slovakia and Czech Republic, 2007)

	Boys						Girls														
	Group 1 ( <i>n</i> = 34)		Group 2 ( <i>n</i> = 139)		Group 3 ( <i>n</i> = 61)		<i>F</i> value <i>df</i>		Scheffé test-differences		Group 1 ( <i>n</i> = 53)		Group 2 ( <i>n</i> = 156)		Group 3 ( <i>n</i> = 37)		<i>F</i> value <i>df</i>		Scheffé test-differences		
	Mean		SD		Mean		SD				Mean		SD		Mean		SD				
Self-esteem																					
Positive	14.3	2.76	15.0	2.12	15.1	2.70	1.43	2	0.24	–	12.7	2.88	14.3	2.28	14.6	2.19	9.32	2	2	<0.001	1–2***, 1–3***
Negative	12.4	2.23	12.2	2.59	11.8	2.47	0.87	2	0.42	–	14.1	2.69	12.4	2.72	12.7	2.68	7.20	2	2	<0.001	1–2***, 1–3***
Self-liking	32.1	6.44	33.8	5.18	35.6	6.97	3.38	2	<0.05	1–3*	28.6	7.93	32.6	6.56	33.6	6.93	7.18	2	2	<0.001	1–2***, 1–3***
Self-competence	33.4	6.42	35.4	5.64	36.0	6.70	1.81	2	0.17	–	30.9	6.86	34.2	5.87	35.5	5.61	7.91	2	2	<0.001	1–2***, 1–3***
Self-efficacy																					
General	56.4	8.50	57.7	7.86	59.1	10.15	1.04	2	0.36	–	51.9	7.89	58.5	9.47	59.8	7.83	12.37	2	2	<0.001	1–2***, 1–3***
Social	18.7	3.23	19.8	3.19	20.7	3.73	3.63	2	<0.05	1–3*	19.1	4.49	20.7	3.74	21.4	3.34	4.71	2	2	<0.01	1–2**, 1–3***
Group 1: no physical activity																					
Group 2: infrequent physical activity																					
Group 3: everyday physical activity																					

\* *p* < 0.05, \*\* *p* < 0.01, \*\*\* *p* < 0.001

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$



The differences were much more pronounced for girls than for boys. Self-liking and social self-efficacy were higher among adolescent boys with higher frequency of physical activity. At the same time, positive self-esteem, self-liking, self-competence and general and social self-efficacy were higher, and negative self-esteem was lower among adolescent girls with a higher frequency of physical activity.

We found that physical activity per week is connected with higher levels of positive aspects of self (positive self-esteem, self-liking, self-competence, and self-efficacy) and with lower levels of negative aspects (negative self-esteem). These findings are in line with previous studies on adolescent girls and boys (White et al. 2009; Annesi 2006; Parfitt and Eston, 2005). Our findings suggest that frequent physical activity was connected with feelings of self-worth (self-esteem, self-liking) and personal efficacy (general or social), which might imply that active engagement in regular physical activity during school or leisure time could improve the way youths perceive themselves. Causal links, however, are not so simple, and influences may go in both directions as well, i.e. a reinforcement of the self might also lead to more physical activity. Therefore, it is necessary to explore this connection further in a future longitudinal study.

Research in this field was done mostly in adolescent girls and adult women (Krahnstoevers Davisona et al. 2007; Schmalz et al. 2007; Levy and Ebbeck 2005). Additionally, our findings cover not only girls but also boys and provide gender comparison. Our separate analyses for boys and girls showed many more associations between physical activity and the self among girls than among boys. Among girls, all aspects of self were higher in case of more frequent physical activity. Among boys, only self-liking and social self-efficacy were higher in the group with everyday physical activity. In general girls tend to report lower levels of self aspects compared with boys (Birndorf et al. 2005; Robins et al. 2002), though this finding was not fully confirmed in our study. At the same time, girls are less engaged in physical activity (Currie et al. 2008). In addition, girls at this age are much more concerned with their physical appearance, are less willing to participate in physical activities and experience less enjoyment from them (Krahnstoevers Davisona et al. 2007). Such negative feelings may contribute to a lower intrinsic motivation for physical activity, implying that girls have to motivate themselves actively to participate in physical activity. This self-motivation may be assumed to require a strong self. Recent studies have indeed confirmed self-consciousness and concerns about appearance as barriers to physical activity among adolescent girls (Robbins et al. 2003; Leslie et al. 1999). At the same time, Gillison et al. (2008) reported in their study that those adolescent girls who are engaged in physical activity perceive it as a sort of duty,

and their motivation is related to physical attractiveness and health benefits and feeling good about themselves, which may be connected with the way they perceive themselves (e.g. self-esteem, self-efficacy, self-liking, and self-competence).

Among boys, aspects of self did not play such an important role as in girls. An explanation could be that their motivation for this activity differs from girls. Boys are more engaged in group sporting activities with the aim of being part of peer relationships, which is not connected directly with the way they perceived themselves. They have some intrinsic motivation for physical activity. Gillison et al. (2008) reported that adolescent boys perceived physical activity as something which forms a large part of their social life and is the way of spending time with their friends. Thus, additional motivation is required less often for them. It is clear, then, that in future research it will be important to take a closer look at the motivation for physical activity and possible barriers to it among adolescent boys and girls.

### Strengths and limitations

This study has several important strengths, the most important one being its high response rate and international sample. Though data were collected in two countries, it is important to mention that Slovakia and Czech Republic were together as Czechoslovakia until 1993, when these countries separated. Due to the relatively short separation and the long common history, these two countries still share very similar linguistic and cultural background and at present have only minor political differences, which should not influence our findings.

On the other side, it also has several limitations. First, only subjective self-reports were used for measuring aspects of self, and especially for measuring physical activity. However, previous studies support the validity of self-reports (Reijneveld et al. 2003). The question on physical activity that we used was adapted from Health Behaviour in School-aged Children (HBSC) survey. Its validity has been tested in following studies in order to provide necessary information about its reliability and validity levels (Booth et al. 2001; Prochaska et al. 2001).

A main limitation is its cross-sectional design, which makes it impossible to formulate conclusive statements about causality in our findings. Our findings therefore need to be confirmed in studies with a longitudinal design. Further studies should take a look at the different age groups, too. As age increases during adolescence, physical activity decreases (Currie et al. 2000, 2004, 2008). The latest 2005/2006 HBSC study in Slovakia (Madarasová Gecková et al. 2009) provides the following information about age differences in physical activity among boys and

girls: No significant differences were found among boys. However, a significant difference was found between 11- and 15-year-old girls with an evident decrease in physical activity between those ages, which was a common trend in most European countries at the time.

## Implications

Physical activity is an excellent way of enhancing physical health during adolescent years, and development of healthy patterns in adolescence can be tracked into adulthood. In addition, evidence shows that regular physical activity could enhance mental health, especially among adolescent girls (White et al. 2009; Schmalz et al. 2007). The fact that a relatively minimal amount of physical activity is related to a more positive perception of self may support adolescent health promotion. At the same time, our findings support using a different approach towards adolescent boys and girls in the promotion of physical activity. Finally, future research should be longitudinal in design in order to assess the causal relationships between physical activity and the self. Our results show that much can be gained in health by further exploring this relationship.

**Acknowledgments** This work was supported by the Slovak Research and Development Agency under contract no. APVV-20-038205 and by the Science and Technology Assistance Agency under contract no. APVT-20-028802. This work was partially (20%) supported by the Agency of the Slovak Ministry of Education for the Structural Funds of the EU, under project ITMS: 26220120058.

**Conflict of interest** The authors declare that they have no competing interests.

## References

- Ajzen I (1988) Attitudes, personality, and behavior. Dorsey Press, Homewood
- Andrews FM, Morgan JN, Sonquist JA, Klem L (1973) Multiple classification analysis. A report on a computer program for multiple regression using categorical predictors. 2nd edn. The University of Michigan, Ann Arbor
- Annesi JJ (2006) Relations of physical self-concept and self-efficacy with frequency of voluntary physical activity in preadolescents: implications for after-school care programming. *J Psychosom Res* 61:515–520
- Bandura A (1986) Social foundations of thought and action: a social cognitive theory. Prentice Hall, Englewood Cliffs
- Birndorf S, Ryan S, Auinger P, Aten M (2005) High self-esteem among adolescents: longitudinal trends, sex differences, and protective factors. *J Adolesc Health* 37:194–201
- Booth ML, Okely AD, Chey T, Bauman A (2001) The reliability and validity of the physical activity questions in the WHO health behaviors in schoolchildren (HBSC) survey: a population study. *Br J Sports Med* 35:263–267
- Campbell JD, Trapnell PD, Heine SJ, Katz IM, Lavalley LF, Lehman DR (1996) Self-concept clarity: measurement, personality correlates, and cultural boundaries. *J Pers Soc Psychol* 70:141–156
- Currie C et al (eds) (2000) Health and health behaviour among young people. WHO Policy Series: international report Health policy for children and adolescents, issue 1. WHO Regional Office for Europe, Copenhagen
- Currie C et al (eds) (2004) Young People's Health in Context: international report from the HBSC 2001/02 survey. WHO Policy Series: Health policy for children and adolescents, issue 4. WHO Regional Office for Europe, Copenhagen
- Currie C et al (eds) (2008) Inequalities in young people's health: international report from the HBSC 2006/06 survey. WHO Policy Series: Health policy for children and adolescents, issue 5. WHO Regional Office for Europe, Copenhagen
- Gillison F, Osborn M, Standage M, Skevington S (2008) Exploring the experience of introjected regulation for exercise across gender in adolescence. *Psychol Sport Exerc* 10:309–319
- Halama P (2008) Confirmatory factor analysis of Rosenberg self-esteem scale in a sample of high school and university students. *Stud Psychol* 50:255–266
- Hallal PC, Victora CG, Azevedo MR, Wells JCK (2006) Adolescent physical activity and health: a systematic review. *Sports Med* 36:1019–1030
- Harter S (1999) The construction of the self. A developmental perspective. Guilford press, New York
- Haug E, Rasmussen M, Samdal O, Iannotti R, Kelly C, Borraccino A, Vereecken C, Melkevik O, Lazzeri G, Giacchi M, Ercan O, Due P, Ravens-Sieberer U, Currie C, Morgan A, Ahluwalia N, The HBSC Obesity Writing Group (2009) Overweight in school-aged children and its relationship with demographic and lifestyle factors: results from the WHO-Collaborative Health Behaviour in School-aged Children (HBSC) Study. *Int J Public Health* 54:S167–S179
- Iannotti RJ, Janssen I, Haug E, Kololo H, Annaheim B, Borraccino A, The HBSC Physical Activity Focus Group (2009) Interrelationships of adolescent physical activity, screen-based sedentary behaviour, and social and psychological health. *Int J Public Health* 54:S191–S198
- Krahnstoever Davisona K, Werdera JL, Trostb SG, Bakerc BL, Birch LL (2007) Why are early maturing girls less active? Links between pubertal development, psychological well being, and physical activity among girls at ages 11 and 13. *Soc Sci Med* 64:2391–2404
- Leslie J, Yancey A, McCarthy W, Albert S, Wert C, Miles O (1999) Development and implementation of a school-based nutrition and fitness promotion program for ethnically diverse middle-school girls. *J Am Diet Assoc* 99:967–970
- Levy SS, Ebbeck V (2005) The exercise and self-esteem model in adult women: the inclusion of physical acceptance. *Psychol Sport Exerc* 6:571–584
- Madarasová Gecková A et al (2009) Social determinants of health among pupils. HBSC, Slovakia, 2005/2006. National report about health and health-related behaviors among 11, 13 and 15-years old pupils based on the survey realized during years 2005/2006 in the frame of international project "Health Behaviour in School Aged Children" (HBSC). Equilibria, s.r.o, Košice
- Mäkinen T, Kestilä L, Borodulin K, Martelin T, Rahkonen O, Prättälä R (2009) Effects of childhood socio-economic conditions on educational differences in leisure-time physical activity. *Eur J Public Health*. doi:10.1093/eurpub/ckp187
- Mann M, Hosman CMH, Schaalma HP, de Vries NK (2004) Self-esteem in a broad-spectrum approach for mental health promotion. *Health Educ Res* 19:357–372
- Parfitt G, Eston RG (2005) The relationship between children's habitual activity level and psychological well-being. *Acta Paediatr* 94:1791–1797
- Prochaska JJ, Sallis JF, Long B (2001) A physical activity screening measure for use with adolescents in primary care. *Arch Pediatr Adolesc Med* 155:554–559



- Reijneveld SA, Crone MR, Verhulst FC, Verloove-Vanhorick SP (2003) The effect of a severe disaster on the mental health of adolescents: a controlled study. *Lancet* 362:691–696
- Robbins LB, Pender NJ, Kazanis AS (2003) Barriers to physical activity perceived by adolescent girls. *J Midwifery and Women's Health* 48:206–212
- Robins RW, Trzesniewski K, Tracy JL, Gosling SD, Potter J (2002) Global self-esteem across the life span. *Psychol Aging* 17:423–434
- Rosenberg M (1965) *Society and adolescent self-image*. Princeton University Press, Princeton
- Sarkova M, Nagyova I, Katreniakova Z, Madarasova Geckova A, Orosova O, Middel B, van Dijk JP, van den Heuvel W (2006) Psychometric evaluation of the general health questionnaire-12 and rosenberg self-esteem scale in hungarian and slovak early adolescents. *Stud Psychol* 48:69–79
- Schmalz DL, Deane GD, Birch LL, Krahnstoever Davison K (2007) A longitudinal assessment of the links between physical activity and self-esteem in early adolescent non hispanic females. *J Adolesc Health* 41:559–565
- Schmitt DP, Allik J (2005) Simultaneous administration of the Rosenberg Self-esteem Scale in 53 nations: exploring the universal and culture-specific features of global self-esteem. *J Pers Soc Psychol* 89:623–642
- Sherer M, Maddux JE, Mercandante B, Prentice-Dunn S, Jacobs B, Rogers RW (1982) The self-efficacy scale: construction and validation. *Psychol Rep* 51:663–671
- Tafarodi RW, Milne AB (2002) Decomposing global self-esteem. *J Pers* 70:443–484
- Tafarodi RW, Swann WB Jr (1995) Self-linking and self-competence as dimensions of global self-esteem: initial validation of a measure. *J Pers Assess* 65:322–342
- Tessier S, Vuillemin A, Bertrais S, Boini S, Le Bihan E, Oppert J, Herberg S, Guillemin F, Briançon S (2007) Association between leisure-time physical activity and health-related quality of life changes over time. *Prev Med* 44:202–208
- White K, Kendrick T, Yardley L (2009) Change in self-esteem, self-efficacy and the mood dimensions of depression as potential mediators of the physical activity and depression relationship: exploring the temporal relation of change. *Ment Health Phys Act* 2:44–52